Classroom Technology Standards

Classroom Technology Support Group
Division of Customer Service
Office of Information Technology
Western Michigan University

The following standards are for classrooms on all Western Michigan University campuses. This document shall be used in connection with any consulting pertaining to classroom technology projects. Outside consultants shall use this standard and adhere to the equipment listed herein to prepare all written bid documentation.

Level 1: General-use classroom designed for twenty to forty-nine students.

General equipment list:

- **Screen, manual, 16:10 format**
- **HD LCD projector, ceiling mounted**
- **Crestron touch panel (annotation optional)**
- **LCD input monitor**
- **Classroom technology station**
- **VOIP two-way Communication using Barix Annuncicom**
- **Three (3) Ethernet connections at cart. One (1) at projector.**
- **Crestron control system**
- **Blu-ray player**
- **HD Document camera**
- **Audio system (speakers and amplifiers)**

Level 2: General-use classroom designed for fifty to ninety-nine students (and some special rooms with less than 50 seats). These classrooms use the equipment as described in Level One. At 50 seats or above, ADA (Americans with Disabilities Act) requires speech/program reinforcement and assistive listening devices; these requirements are reflected in the equipment choices.

General equipment list:

- **Screen, manual, 16:10 format**
- **HD LCD projector, ceiling mounted**
- **Crestron touch panel (annotation optional)**
- **LCD input monitor**
- **Classroom technology station**
- **VOIP two-way Communication using the Barix Annuncicom**
- **Three (3) Ethernet connections at cart. One (1) at projector.**
- **Crestron control system**

- **Blu-ray player**
- **HD Document camera**
- **Audio system (speakers and amplifiers)**
- **Gooseneck microphone**
- **Adaptive listening system for ADA compliance**

Level 3: Large classroom designed for one hundred or more students (and some 50+ tiered rooms). Fixed auditorium seating is typical in these classrooms. There are state/federal rules controlling the design of these rooms to assure compliance with ADA (Americans with Disabilities Act). An auditorium would be equipped with items included under Level 2, and additional adjustments made because of room size (ie. audio system complexity, powered projection screen and dual or blended projection).

General equipment list:

- **Screen(s), motorized, 16:10 format**
- **HD LCD projector(s), ceiling mounted**
- **Crestron touch panel w/ annotation**
- **Classroom technology station**
- **VOIP two-way communication using the Barix Annuncicom**
- **Three (3) Ethernet connections at cart. One (1) at projector.**
- **Crestron control system**
- **Blu-ray player**
- **HD Document camera**
- **Audio system (voice and program speakers w/ amplifiers)**
- **Gooseneck microphone and 2 wireless, lapel microphones**
- **Adaptive listening system for ADA compliance**

AV Component Specifications

1. Screens

A. Screens shall be mounted flush with the ceiling or above the ceiling in rooms that have 8-foot ceilings. The bottom of the projected image should be no less than 38″ off the floor.

B. Image size should be calculated using the following formula:

For HDTV projection (16:9), Widescreen, 16:10, or 15:9 formats, screen height should equal 1/5 the distance from the screen to the furthest most seat or maximum height less than 38″ from the floor.

C. Screens in level 1 and level 2 rooms are a 16:10, 72.5″ x 116″ manual screen.

D. Level 3 rooms require a 16:10 ratio motorized screen.

E. Screen location is determined by locating the screen away from the teaching station. Use the center of the front of the room as a starting point for the edge of the screen. Imagine a 2-screen setup and remove the screen closet to the teaching station. (See Fig. 1)

2. **Projectors**

A. Projectors are purchased by Western Michigan University under a contract with EPSON America, Inc.

B. Current projectors being used in classrooms:

1. Level 3: PowerLite Pro Z8000WUNL (V11H266920)
2. Level 1 & 2: PowerLite Pro G6550WU (V11H513020)

C. Projectors should be mounted using above ceiling grid mounts where appropriate.

1. The projector should also be mounted as close to the ceiling as possible with minimal keystone of the image.

2. Lecture hall projectors will be mounted with a projector lift (where necessary).

D. Projection distance can be calculated using EPSON's Distance Calculator:

http://www.epson.com/alf_upload/landing/distance-calculator/

E. In a two-projector room, the projectors shall be labeled on the front facing the instructor as "Projector 1" to the left and "Projector 2" to the right. (Fig. 1)

F. The primary projector will be that projector farthest from the technology station. This projector would be the single image projector and the second projector would be used only when two projectors are being used.

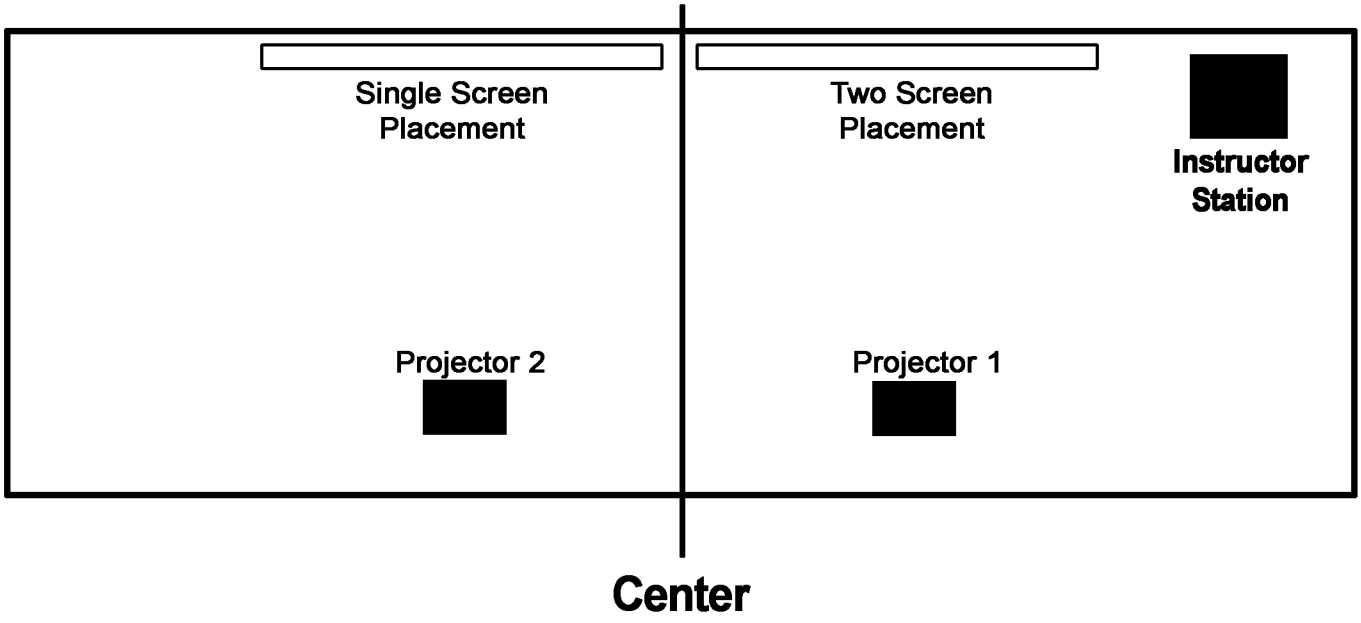


Fig. 1

3. **Touch Panels**

A. Touch panels shall be from Crestron Inc.

B. Current touch panels being used:
   1. Level 3: V24R-C V-Panel
   2. Level 1 & 2: TPS-6L wall mount.

a. Side buttons shall be engraved according to the following matrix. (Fig. 2)
b. Bezels shall be model TPS-6L-FPB-T_Engraved
c. Panels shall be mounted in a custom black housing that allows for the face to be at a 45° angle. (Fig. 3) Installer shall use the diagram in (Appendix A) as a guide to have these housings manufactured.

Buttons	**Left**	**Right**
1 (Top)	START	VOL +
2	LAPTOP	VOL -
3	BLU-RAY DVD	MUTE
4	DOC CAM	MIC +
5	AUX	MIC -
6 (Bottom)	SHUT DOWN	HELP

Fig. 2

Fig. 3

See drawing

Appendix A.1

C. The internal speaker and microphone for the touch panel shall be wired to use the Barix VOIP System.
   1. The TPS-6L will need the speaker option added to the unit.
   2. Volume settings on all panels should be set at 95%.

4. **Classroom Technology Stations**

A. Classroom technology stations shall be provided according to the following specifications:
   1. Level 3: Marshall Furniture (Model: MFI #16236MW) (Fig. 4)
      a. Wood – finish to be determined by WMU
      b. Back that is removable and lockable

Fig. 4

See drawing

Appendix A.2

   2. Level 1 & 2: Spectrum (Model: 55260HD) (Fig.5) or (Model: 55123HD) (Fig. 6)
      a. Metal – color and laminate color to be determined by WMU
      b. Logo Panel (Model: 55261) or (Model: 55141)
      c. Shelf on side for document camera (Model: 55163) or (Model: 55140)
      d. One handle opposite the shelf (Model: 55265) or (Model: 55132)

Fig. 5

See Drawing

Appendix A.3

See Drawing

Appendix A.4

Fig. 6

5. **Lighting Zones**

A. Classroom lighting shall have a minimum of two zones:
   1. Lighting fixtures closest to the projection screens should be dimmable or on their own switch.
   2. Preferably each zone would be dimmable and controllable from the front of the classroom.
   3. Classroom lighting should be installed so as to allow for the projectors to be mounted as close to the ceiling as possible.

B. In Level 3 rooms the lighting shall be set through the lighting control to:
   1. Scene 1 Default, when room is opened. All lights on 80% but slightly dimmer on screen.
   2. Scene 2 All on. 100% on. Evenly bright throughout room.
   3. Scene 3 Note taking with projection. 35% on. No light on screen
   4. Scene 4 Watching screen with safe lights on. Floor and exit door lights.
   5. Scene 5 All off.

6. **White Boards**

A. White boards shall be mounted on as much front wall surface, as is practical.

B. Allow at least 6′ continuous whiteboard space to side of lowered screen, closest to teaching station.

C. Marker boards shall be provided with a full width tray for erasers and markers and map rail with cork insert.

7. **Barix System**

A. The unit shall be a Barix Annuncicom 100 (Fig. 7).
B. Power to the unit shall be provided by the Phoenix connector
C. “Line in” and “Line out” shall be used for audio input and output (not mic).
D. Crestron programming code shall work in connection with the Barix to show touch panel Help pages (Appendix C) during communication.

Fig. 7

8. **Network Lines**

A. There shall be four (4) Cat-6 network lines used in each classroom technology station
   1. One (1) for the instructor’s laptop
   2. Two (2) connected to a router, Cisco/Linksys RV082 (Fig. 8)
   3. One (1) line to projector.

B. Two (2) Network lines will run directly into the technology stations and be terminated into a router (Fig. 6). Three 3’ patch cables are used to connect three Crestron devices, the Blu-ray player and the Barix unit.

C. One network line will run directly into the technology station with a single terminator and 7’ patch cable to the desktop.

Fig. 8

9. **Control Units**

A. The control unit shall be a Crestron DMPS series.
   1. Level 1 & 2 classrooms shall use model DMPS-300-C.
   2. Level 3 classrooms shall use model DMPS-300-C.

10. **Analog/Digital media distribution**

A. The media distribution unit shall be a Crestron DM series.
   1. Level 1 & 2 classrooms shall use model DM-MD6x1.
   2. Level 3 classrooms shall use model DM-MD8x8 or larger as needed.

11. **Crestron Programming**

A. Programming for any non general purpose classroom shall be done by certified Crestron Programmer.

B. Touch Panel standards and programming will be provided by WMU.

C. Review of programming shall be done during install.
   1. A minimum of one review before download for all level of classrooms shall be completed between the programmer and a WMU classroom technology staff member.
   2. All corrections are to meet the WMU classroom technology standard shall be completed in a timely manner with regards to project deadline completions.

D. Programming will include Crestron's RoomView® and e-control pages.
   1. The programmer shall use current version of RoomView® and establish an IPID.
   2. The programmer will work with Classroom Technology Help Desk to establish connection from each classroom to CTHD.

12. **Power Requirements**

A. There shall be a standard outlet box within one stud width from where the cables come out of the wall for the main power line to the classroom technology station.

B. There shall be two power outlets available in the cable cubby on the technology station.

C. Multi-outlet surge protectors shall be used for equipment power and attached to the rack within the technology station, behind the equipment.

D. Power at the projector location should have a standard outlet either directly above the ceiling or flush mounted in a ceiling tile within close proximity of the projector location.

13. **Cabling**

A. DM 8G+ DM-CBL-8G-NP or DM-CBL-8G-P, and audio cabling should run from the projector or speakers to the provided conduit down the wall to a two gang extra deep box that has a 2″ grommet hole on the cover. Conduit through the wall shall be 1 ½″

B. All cabling in the 10 foot umbilical should be sheathed in snakeskin from the wall plate into the technology station with strain relief inside the cart.

C. The power cord to the technology station should match the umbilical length and be "zipped" to the umbilical cord as one run across the floor.

D. All cables should be labeled and each end.

14. **Documentation from Installer**

A. Final drawings shall be proved electronically.

B. A copy of all manuals and warranties shall be provided.

C. Before installation completion, WMU and the installer shall provide the make, model and serial numbers for all equipment and in which rooms this equipment has been or will be installed.

D. At least two weeks prior to the installation of equipment the MAC addresses shall be provided for the Crestron control units and the Barix units. WMU will then assign IP addresses to these units, and in turn give these IP addresses to the installer/programmer.

E. Two complete copies of the Crestron programming shall be provided on CD to the WMU classroom technology staff.

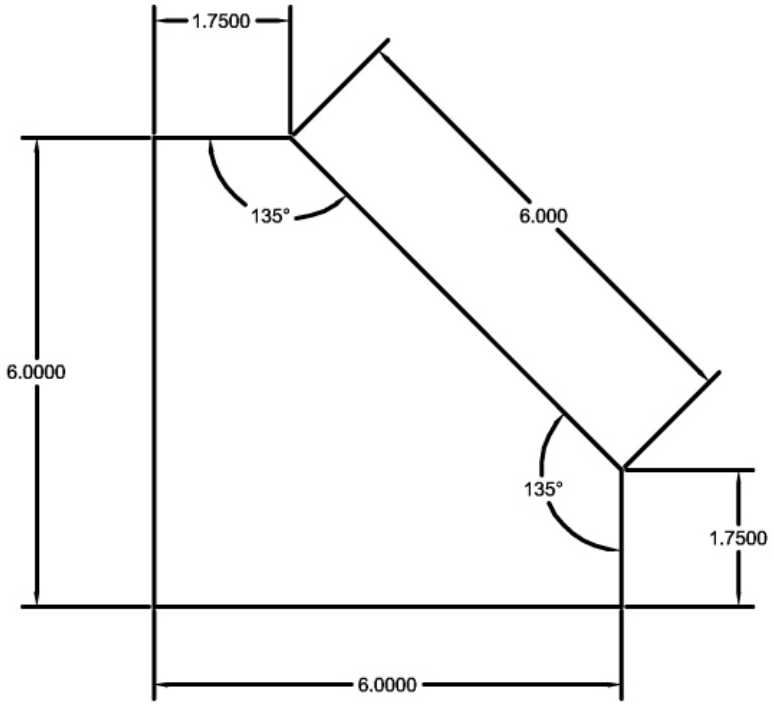
F. Inventory (make, model, SN) of all installed equipment will be provided for each room.

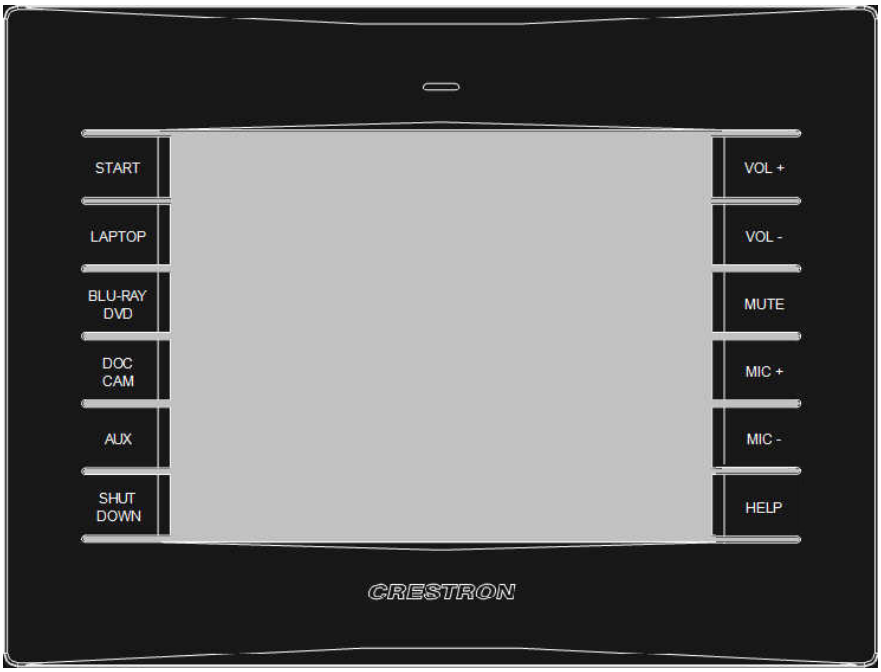
15. **Security**

A. Projector security shall include key-locking projector mount with security screws.

Appendix A

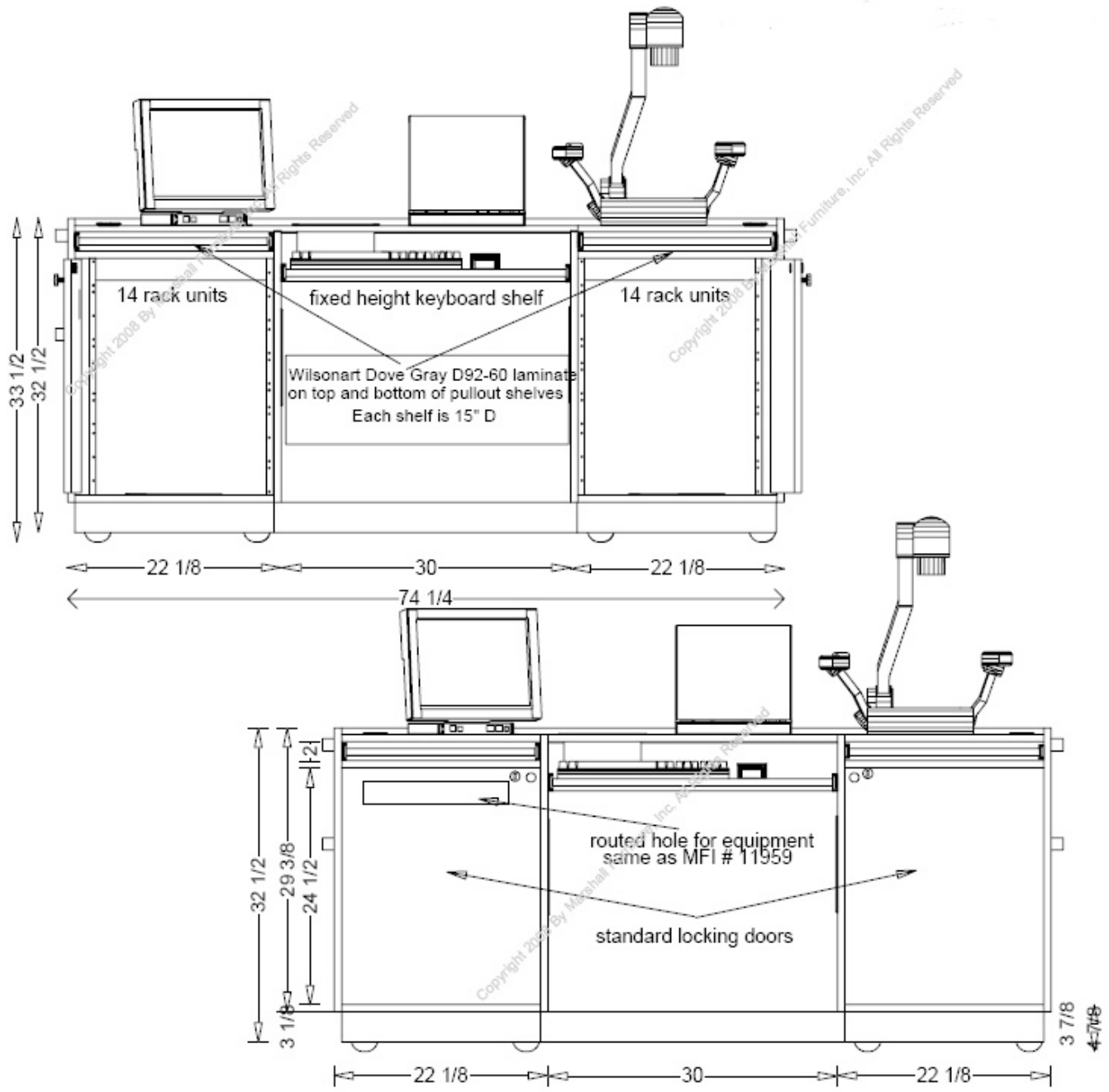
A.1 Touch Panel Housing





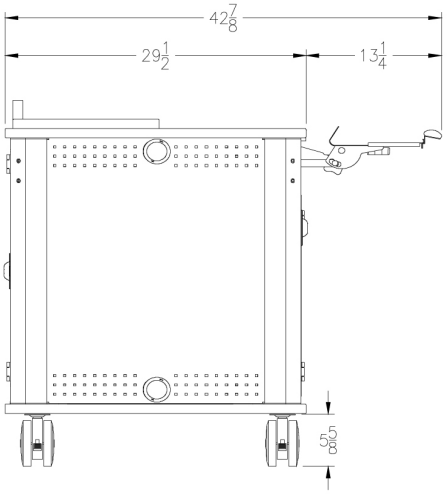
Front view

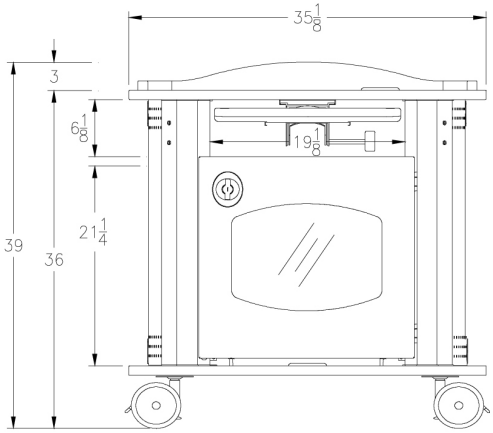
A.2 Marshall Furniture Custom Desk



A.3 Spectrum Technology Station

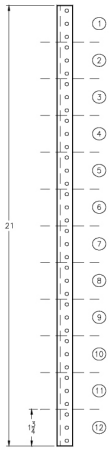
55123TW
36" Link Lectern w/ Twin-Wheel casters



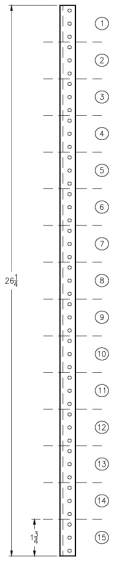


Note: *Modified worksurface cut-outs should be reviewed by Tech Service to ensure clearance of brackets, keyboard slides, or other objects under the worksurface.*

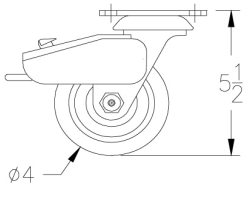
Designed for indoor use only
Spectrum carts and lecterns are designed and constructed for indoor use only. Moving or using outdoors or on excessively rough surfaces may cause damage to the cart or casters and may void the warranty. If an outdoor application is desired, please contact us to discuss potential custom design solutions.



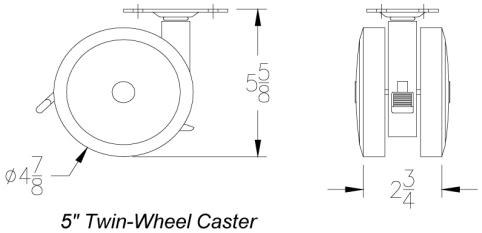
36" LINK Lectern Rack Rail
(12 Rack-Units available)



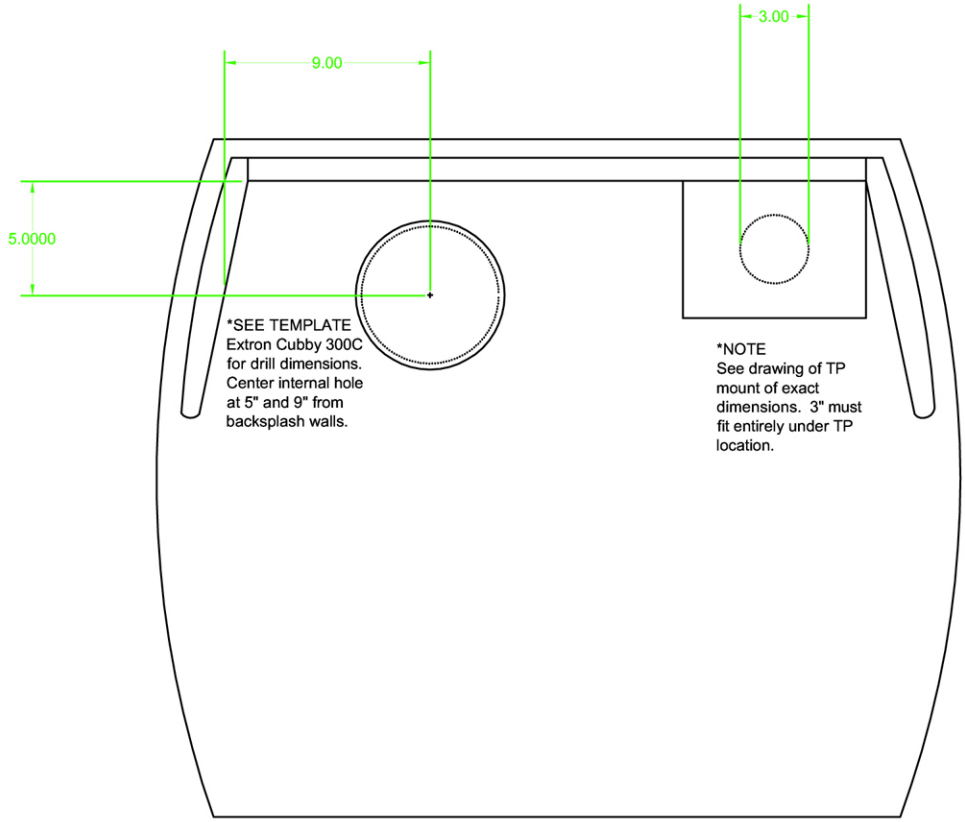
42" LINK Lectern Rack Rail
(15 Rack-Units available)



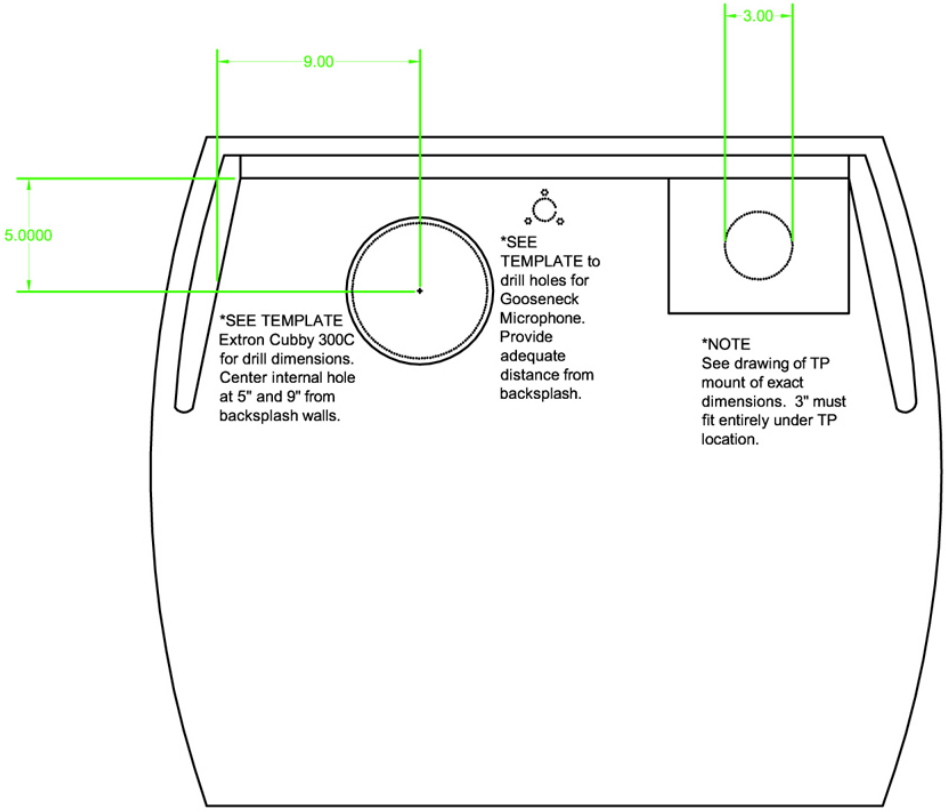
4" Caster



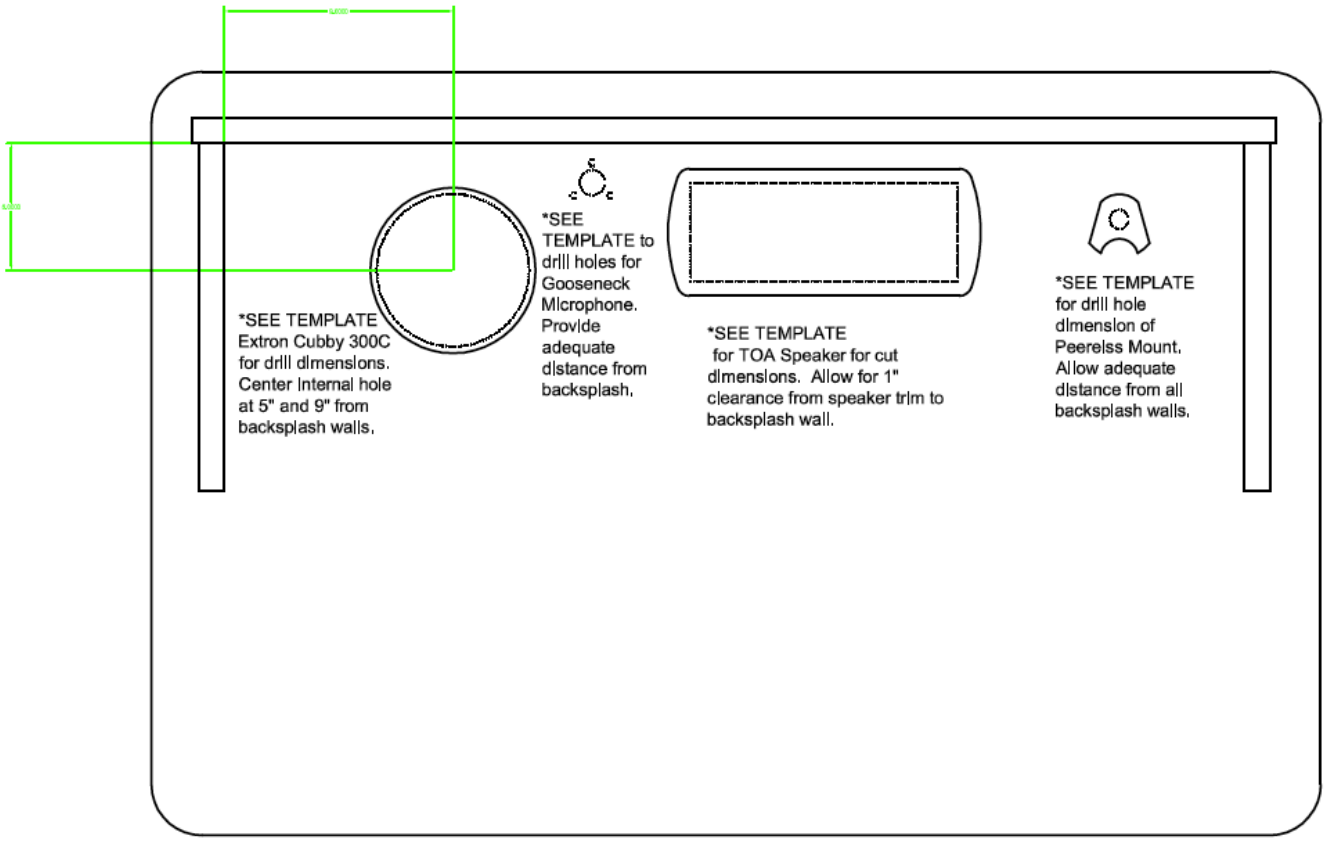
5" Twin-Wheel Caster



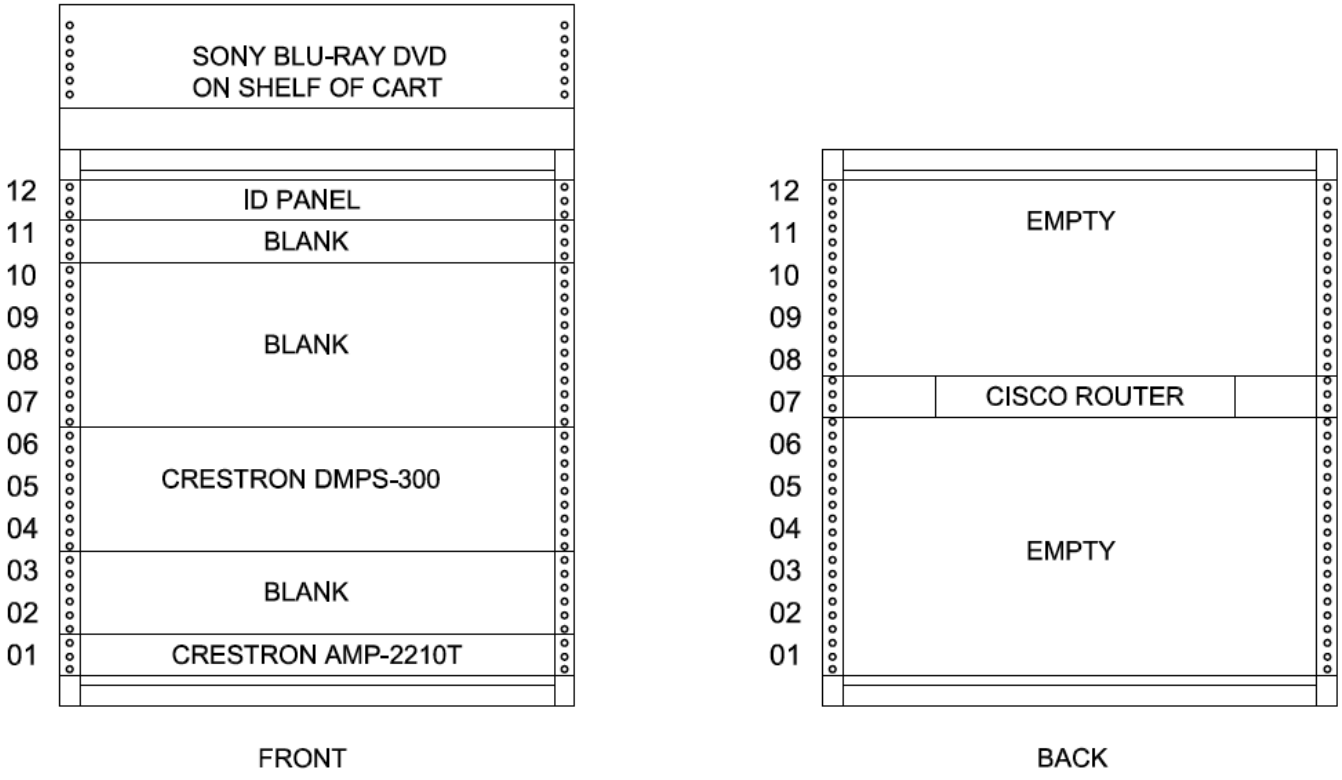
Cut Out for Link Cart, Level 1



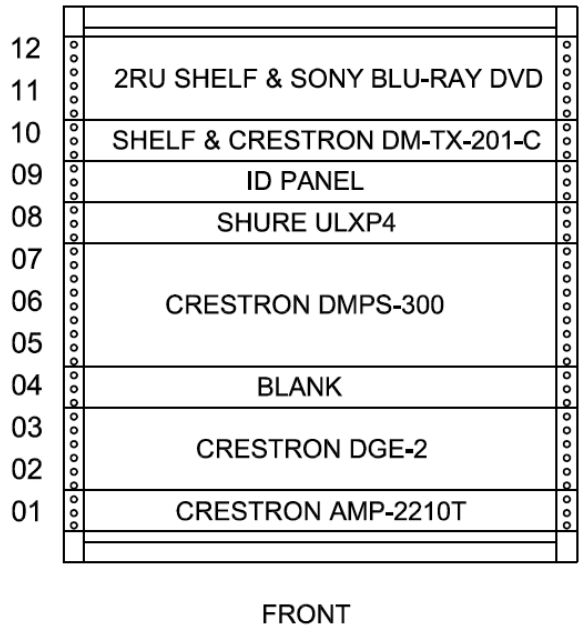
Cut Out for Link Cart, Level 2

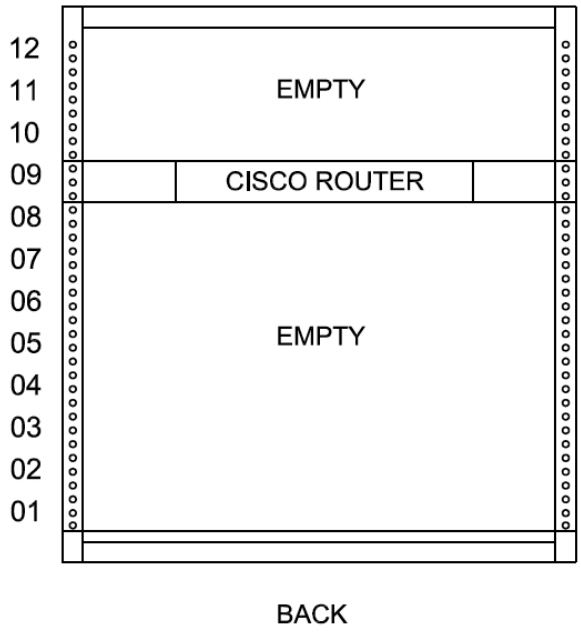

*SEE TEMPLATE Extron Cubby 300C for drill dimensions. Center internal hole at 5" and 9" from backsplash walls.
*SEE TEMPLATE to drill holes for Gooseneck Microphone. Provide adequate distance from backsplash.
*SEE TEMPLATE for TOA Speaker for cut dimensions. Allow for 1" clearance from speaker trim to backsplash wall.
*SEE TEMPLATE for drill hole dimension of Peerelss Mount. Allow adequate distance from all backsplash walls.

Cut Out for Media Director Cart, Level 3



Rack Elevation, Link Cart, Level 1 & 2





Rack Elevation, Media Director, Level 3

Appendix B

Level 1 Classroom Detail

Model	Family	Description
V11H513029	Epson	Projector, G6550WU, WUXGA 5200
RPMA298	Chief	RPA Elite Custom mount for 5750 w/ Keyed Lock
CMA440	Chief	Ceiling Plate, 8" X 24"
P30HD	Elmo	Document Camera 1080p
206213	Draper	Luma 2 w/ auto return, 123", 16:10, matte white, sewn hem
206210	Draper	Luma 2 w/ auto return, 109", 16:10, matte white, sewn hem
206216	Draper	Luma 2 w/ auto return, 137", 16:10, matte white, sewn hem
227212	Draper	6" Wall bracket, white
55123HD	Spectrum Ind.	LINK Lectern 36" Tall w/ 4" casters
55132	Spectrum Ind.	Steel Handle
55140	Spectrum Ind.	Flip-up document camera shelf
55134	Spectrum Ind.	LINK Lectern Rear Rack Rail Kit
55141	Spectrum Ind.	Custom-Cut Logo
60-527-01	Extron	Cable Cubby 300C Blk
BDP-S185	Sony	Blu-ray Player
RSH-4A3R Sony	Middle Atlantic	Custom rack mount for the Sony BDP-S185 Blu-ray Player
PD-815SC	Middle Atlantic	Slim Powerstrip, 8 outlets, 15 amp w/ cord
DMPS-300-C	Crestron	Digital Media Presentation System multimedia matrix switcher, mic mixer, audio DSP, amplifier, and DigitalMedia™ distribution center.
DM-RMC-100-C	Crestron	DigitalMedia™ CAT Receiver & Room Controller
TPS-6LB-T	Crestron	Isys 5.7" Wall Mount Touchpanel, Black, Textured. Requires SPK-6L to enable audio input and intercom capability. Includes TPS-6L-FPB-T_BLANK button faceplate, TPS-6L-FPB-T-NB_BLANK no-button faceplate, and (1) set mounting clips.
TPS-6L-FPB-T_ Engravable	Crestron	Engravable Faceplate w/ Buttons for TPS-6L, black, textured, engraving not included
SPK-6L	Crestron	Speaker Kit for TPS-6L
Custom		Touch Panel Mount w/ 45 degree viewing angle.
AMP-2210T	Crestron	2x210W 70Volt Audio Amplifier
CA-525T	Klipsch	White 5.25" woofer, 1" titanium tweeter, 30W transformer
Annuncicom 100	Barix	Voice over IP device w/ mic input, 3.5mm, line in/out on RCA, RS-232 pass through.
Mount bracket	Barix	Molded plastic mount for Annuncicom 100
RV082	Cisco	Cisco/Linksys Router

Level 2 Classroom Detail

Model	Family	Description
V11H513029	Epson	Projector, G6550WU, WUXGA 5200
RPMA298	Chief	RPA Elite Custom mount for 5750 w/ Keyed Lock
CMA440	Chief	Ceiling Plate, 8" X 24"
P30HD	Elmo	Document Camera 1080p
206213	Draper	Luma 2 w/ auto return, 123", 16:10, matte white, sewn hem
206210	Draper	Luma 2 w/ auto return, 109", 16:10, matte white, sewn hem
206216	Draper	Luma 2 w/ auto return, 137", 16:10, matte white, sewn hem
227212	Draper	6" Wall bracket, white
55123HD	Spectrum Ind.	LINK Lectern 36" Tall w/ 4" casters
55132	Spectrum Ind.	Steel Handle
55140	Spectrum Ind.	Flip-up document camera shelf
55134	Spectrum Ind.	LINK Lectern Rear Rack Rail Kit
55141	Spectrum Ind.	Custom-Cut Logo
60-527-01	Extron	Cable Cubby 300C Blk
BDP-S185	Sony	Blu-ray Player
RSH-4A3R	Middle Atlantic	Custom rack mount for the Sony BDP-S185 Blu-ray Player
PD-815SC	Middle Atlantic	Slim Powerstrip, 8 outlets, 15 amp w/ cord
DMPS-300-C	Crestron	Digital Media Presentation System multimedia matrix switcher, mic mixer, audio DSP, amplifier, and DigitalMedia™ distribution center.
DM-RMC-100-C	Crestron	DigitalMedia™ CAT Receiver & Room Controller
TPS-6LB-T	Crestron	Isys 5.7" Wall Mount Touchpanel, Black, Textured. Requires SPK-6L to enable audio input and intercom capability. Includes TPS-6L-FPB-T_BLANK button faceplate, TPS-6L-FPB-T-NB_BLANK no-button faceplate, and (1) set mounting clips.
TPS-6L-FPB-T_ Engravable	Crestron	Engravable Faceplate w/ Buttons for TPS-6L, black, textured, engraving not included
SPK-6L	Crestron	Speaker Kit for TPS-6L
Custom		Touch Panel Mount w/ 45 degree viewing angle.
AMP-2210T	Crestron	2x210W 70Volt Audio Amplifier
CA-525T	Klipsch	White 5.25" woofer, 1" titanium tweeter, 30W transformer
Annuncicom 100	Barix	Voice over IP device w/ mic input, 3.5mm, line in/out on RCA, RS-232 pass through.
Mount bracket	Barix	Molded plastic mount for Annuncicom 100
RV082	Cisco	Cisco/Linksys Router
MX418/C	Shure	18" Cardioid condenser gooseneck microphone, attached XLR preamp, charcoal gray, locking shock flange mount, Snap-fit foam windscreen.
SI30	Sennheiser	Two channel switchable or stereo IR transmitter. (2.3/2.8 MHz) Requires NT20-1-120 (9.0 oz). Coverage: 750 sq. ft. (mono), 375 sq. ft. (stereo)
IZK20	Sennheiser	Mounting clamp for SI20, SZI30-R, SI30 and SZI30 (0.5 oz)
Router	Cisco	Cisco/Linksys RV082

Level 3 Classroom Detail

Model	Family	Description
V11H266920	Epson	Projector, PL Pro Z8000WUNL
V12H004S04	Epson	Standard Zoom Lens
VCM011E	Chief	VCM inverted heavy-duty projector mount
P30HD	Elmo	Document Camera 1080p
100XXX	Draper	Signature/Series V, 16:10, matte white
BDP-S185	Sony	Blu-ray Player
RSH-4A3R	Middle Atlantic	Custom rack mount for the Sony BDP-S185 Blu-ray Player
PD-815SC	Middle Atlantic	Slim Power strip, 8 outlets, 15 amp w/ cord
DM-RMC-100-C	Crestron	DigitalMedia Room Controller & DM CAT Receiver
DMPS-300-C	Crestron	Digital Media Presentation System
DM-MD8X8	Crestron	8x8 DigitalMedia™ Switcher
DMC-C	Crestron	DigitalMedia 8G™ CAT Input Card for DM Switcher
DMC-DVI	Crestron	DVI/RGB Input Card for DM Switcher
DMCO-55	Crestron	Quad DM 8G CAT Output Card w/HDMI for DM-MD 8x8
DMCO-33	Crestron	4 HDMI w/stereo Analog Audio Output Card for DM-MD 8x8
60-1064-01	Extron	DVI-RGB8200 DVI to RGBHV Converter
60-635-21	Extron	MVX44 VGA A 4x4 VAG with Audio Matrix Switcher
HA5	AJA	HDMI to HD/SD-SDI Converter
DGE-2	Crestron	Digital Graphics Engine
DM-TX-201-C	Crestron	DigitalMedia CAT Transmitter 200
PRO2	Crestron	Crestron Integrated Control System Processor
C2ENET-1	Crestron	Single Port Ethernet Expansion Card
CTS-3200A	Crown	Audio Power Amplifier (4 Channels 190W/ch)
V24	Crestron	V-Panel™ VESA Mount Touchpanel Display, Black
LCT-101	Peerless	LCD Screen Articulating Desktop Mount
CA-525T	Klipsch	White 5.25" woofer, 1" titanium tweeter, 30W transformer
Annuncicom 100	Barix	Voice over IP device w/ mic input, 3.5mm, line in/out on RCA, RS-232 pass through.
Mount bracket	Barix	Molded plastic mount for Annuncicom 100
SI30	Sennheiser	Two channel switchable or stereo IR transmitter. (2.3/2.8 MHz) Requires NT20-1-120 (9.0 oz). Coverage: 750 sq. ft. (mono), 375 sq. ft. (stereo)
IZK20	Sennheiser	Mounting clamp for SI20, SZI30-R, SI30 and SZI30 (0.5 oz)
Router	Cisco	Cisco/Linksys RV082
Nexia CS	BIAMP	10 mic/line inputs and 6 mic/line outputs, 1RU. DSP for conference applications such as boardrooms, courtrooms, and council chambers.
MDSM 60/75	Marshall	Technology Station
MX418/C	Shure	18" Cardioid condenser gooseneck microphone, attached XLR preamp, charcoal gray, locking flange mount, Snap-fit foam windscreen.
WL185	Shure	Lavalier Condenser Microphones
ULXP4D	Shure	Two receivers, includes PS41US power supplies, four ½ wave antennas, plus rack mounting and link hardware
ULX1	Shure	Bodypack Transmitter
H-1	TOA	Interior Design Speaker
MX395/B/O	Shure	Microflex Low Profile Boundary Microphone